



DEPARTMENT OF HEALTH AND HUMAN SERVICES

Food and Drug Administration

[Docket No. FDA-2023-N-0721]

Center for Devices and Radiological Health Radiation Sterilization Master File Pilot Program

AGENCY: Food and Drug Administration, HHS.

ACTION: Notice.

SUMMARY: The Food and Drug Administration’s (FDA, Agency, or we) Center for Devices and Radiological Health (CDRH or Center) is announcing its Radiation Sterilization Master File Pilot Program (“Radiation Pilot Program”). The Radiation Pilot Program is voluntary and intends to allow companies that terminally sterilize single-use medical devices (“sterilization providers”) using gamma radiation or ethylene oxide (EO) to submit Master File(s) when making certain changes to sterilization sites, methods, or processes under the specific conditions outlined in this notice. Under this voluntary pilot program, manufacturers of class III devices subject to premarket approval (“PMA holders”) who have been granted a right of reference by a sterilization provider may, upon notification from FDA that a manufacturer may do so, include references to Master File(s) accepted into the Radiation Pilot Program in postapproval reports describing the particular changes noted above affecting the sterilization sites, methods, or processes of their class III devices, in lieu of submitting premarket approval application (PMA) supplements for such changes. By helping industry advance alternatives for gamma radiation and EO sterilization of medical devices, the Radiation Pilot Program seeks to help ensure patient access to safe medical devices and, through evaluation of data from pilot participants, provide insights into future regulatory approaches that may help address potential device shortages related to sterilization site, method, or process shifts and facilitate supply chain resiliency.

DATES: FDA is seeking participation in the voluntary Radiation Pilot Program beginning [INSERT DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. See the “Participation” section for eligibility criteria for participation in the Radiation Pilot Program and the “Procedures” section for instructions on how to submit a Master File for consideration for inclusion into the Radiation Pilot Program. Up to nine eligible participants may be selected for the Radiation Pilot Program.

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SUPPLEMENTARY INFORMATION:

I. Background

Radiation-based sterilization is widely used to sterilize medical devices and thereby keep them safe for patient use. Established sources of radiation that may be used to generate radiation for medical device sterilization in accordance with FDA-recognized international consensus standards include gamma radiation, x-rays, and electron beams. Of these three types of radiation-based sterilization, gamma radiation is the most frequently used radiation source for medical device sterilization and, more broadly, is the second most frequently used sterilization method by sterilization providers,¹ accounting for approximately 40 to 45 percent of sterile medical devices (Ref. 1). The most frequently used sterilization method is ethylene oxide (EO), which is used to sterilize approximately 50 percent of sterile medical devices (Ref. 2).

Before sterile medical devices subject to PMA requirements are approved for marketing, FDA reviews the submitted PMA to determine if the sterility information is adequate (e.g., in accordance with internationally agreed upon voluntary consensus standards that FDA recognizes). If a medical device manufacturer changes the sterilization method (i.e., changes the type of

¹ In this notice, “method” or “modality” generally refers to the type of sterilization and “processes” generally refers to steps within that method to achieve a sterile device.

sterilization modality used), process, or facility identified in its original PMA submission for sterilizing its devices, the manufacturer generally needs to submit a PMA supplement so the Agency can review these changes (Ref. 3).

However, FDA recognizes the need to facilitate more timely changes to alternative sterilization methods, processes, or sites among sterilization providers who use gamma radiation or EO to support sterilization supply chain resiliency.² In the case of gamma radiation, the radiation used for medical device sterilization is generated using radioactive cobalt (Co⁶⁰) as a source material, and there may be potential supply chain constraints for Co⁶⁰ relative to the level of demand for radiation sterilization (Ref. 4). FDA also is aware of ongoing supply chain considerations for EO sterilization of medical devices as well as concerns about the effects of EO exposure and environmental emissions. In 2019, FDA was made aware of closures of device sterilization facilities due to concerns about the level of EO emissions (Ref. 5). The Agency worked with device manufacturers affected by the closures to minimize impact to patients who needed device access and continues to work with manufacturers and collaborate with external stakeholders to mitigate the risk of device shortages related to reduction in EO sterilization capacity.³

For these reasons, FDA is announcing and soliciting voluntary participation in the Radiation Pilot Program. Under this pilot program, sterilization providers that sterilize single-use medical devices using gamma radiation may submit a Master File when making certain changes between sterilization sites, certain changes to sterilization methods to utilize non-gamma radiation sources (i.e., x-ray or electron beam), or certain changes to sterilization processes to utilize reduced gamma radiation doses. Also under this pilot program, sterilization providers that

² Further, FDA more generally seeks to improve and strengthen the device supply chain through other broader initiatives, such as the planned Resilient Supply Chain and Shortages Prevention Program (RSCSPP). See FDA's Budget, Medical Device Supply Chain and Shortages Prevention Program, <https://www.fda.gov/news-events/fda-voices/fdas-budget-medical-device-supply-chain-and-shortages-prevention-program>.

³ For more information regarding FDA's sterilization master file pilot programs and other ongoing efforts to facilitate innovation in medical device sterilization, see the Agency's website, *Sterilization for Medical Devices*, available at: <https://www.fda.gov/medical-devices/general-hospital-devices-and-supplies/sterilization-medical-devices>.

sterilize single-use medical devices using EO may submit a Master File when changing from an EO sterilization method to an x-ray or electron beam-based sterilization method. After a Master File has been submitted by a sterilization provider and accepted into the Radiation Pilot Program, a PMA holder may, upon FDA's permission, include a reference to a Master File in a postapproval report filed in accordance with § 814.84 (21 CFR 814.84), as relevant to describe changes affecting the sterilization of the PMA holder's class III device(s) and provided that the PMA holder has a right of reference to the Master File. The PMA holder may include this reference in a postapproval report to satisfy the requirements of § 814.39(a) and (e) (21 CFR 814.39(a) and (e)) and in lieu of submitting a PMA supplement for such changes. This pilot program is intended to provide expeditious review and feedback to sterilization providers on Master File submissions used to support certain changes made to sterilization sites, methods, or processes, and to PMA holders on the ability to reference such Master Files in a postapproval report rather than a PMA supplement. A postapproval report filed under this pilot program does not remove or replace the requirement to submit periodic (annual) reports identifying changes made to the PMA under § 814.39(b). FDA intends to evaluate pilot participation and the progress of the pilot in 6-month increments to inform possible longer term initiatives related to device sterilization methods and provide any updates to the pilot in a subsequent notice, if appropriate. At this time, PMAs reviewed by the Center for Biologics Evaluation and Research (CBER) and PMAs for combination products⁴ are not eligible for this pilot. FDA is not including 510(k) devices within the scope of the pilot at this time. Manufacturers of 510(k) devices that are sterilized using gamma radiation or EO, and that are affected by changes to sterilization sites, methods, and/or processes, should evaluate the changes according to FDA's Guidance, "Deciding

⁴ See 21 CFR 3.2(e).

When to Submit a 510(k) for a Change to an Existing Device”⁵ to determine whether a new 510(k) is required.⁶

For the purposes of this document, the term “sterilization provider” includes a device manufacturer’s own in-house sterilization facility or a device manufacturer’s contract sterilization provider and encompasses any subcontractor facilities utilizing the same quality system as the contract sterilization provider, as applicable.

A. Participation

Up to nine sterilization providers may be included for participation in this voluntary Radiation Pilot Program. The pilot program is limited to selected sterilization providers that follow the procedures set forth in section I.B and that also meet the following eligibility criteria:

1. Be a sterilization provider of a single-use device that is provided sterile;
2. Be in good compliance standing with the Agency;
3. Have an approved gamma radiation or fixed chamber EO sterilization process for the device in an existing PMA; and
4. Be proposing one of the following changes:
 - a. A change from a gamma radiation sterilization process at an existing PMA-approved sterilization site to the same gamma radiation sterilization process at a different site for the same sterilization provider;
 - b. A change from a gamma radiation sterilization process at an existing PMA-approved sterilization site to an x-ray or electron beam radiation sterilization process at the same site or at a different site for the same sterilization provider;

⁵ FDA Guidance, “Deciding When to Submit a 510(k) for a Change to an Existing Device” is available at: <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/deciding-when-submit-510k-change-existing-device>.

⁶ Generally, a new 510(k) would not be required for the types of changes described in this pilot if, following evaluation under the relevant regulations, a device manufacturer determines that the changes could not significantly affect the performance or biocompatibility of the device, or constitute a major change or modification in the intended use of the device.

- c. A change from a gamma radiation sterilization process at an existing PMA-approved sterilization site to a gamma radiation sterilization process with a lower radiation dose than the original process at the same site or at a different site for the same sterilization provider; or
- d. A change from a fixed chamber EO sterilization method at an existing PMA-approved sterilization site to an x-ray or electron beam radiation sterilization method at the same site or at a different site for the same sterilization provider.

Sterilization processes that include changes to the sterilization dose, radiation source (e.g., gamma radiation changed to electron beam or x-ray radiation), or sterilization method that may impact the device's specifications, device performance, biocompatibility, toxicology, or safety and effectiveness profile, and for which appropriate risk mitigation measures that would prevent such impacts are not identified, are outside the scope of the Radiation Pilot Program. For the changes described in 4 above, the sterilization validation activities for the new radiation sterilization process should conform to the FDA-recognized consensus standards found in Parts 1 through 3 of *ISO 11137: Sterilization of health care products--Radiation* to be within the scope of this pilot program. Sterilization providers who do not meet criteria 1 to 4 listed above will be deemed ineligible for the Radiation Pilot Program.

The following are outside the scope of the Radiation Pilot Program and are inappropriate for inclusion in this pilot:

1. Reusable devices, reprocessed single-use devices, or devices that are provided non-sterile.
2. Combination products.
3. Devices regulated by CBER.
4. Sterilization providers that do not have an approved gamma radiation or fixed chamber EO sterilization process for the device in an existing PMA.
5. Changes in contract sterilization providers or addition of a new sterilization provider not approved in an existing PMA.

6. Changes to device design, specifications, or materials.
7. Sterilization processes used only for intermediate processing prior to final device assembly.
8. Devices with alternate sterility assurance levels other than 10^{-6} .

B. Procedures

While the sterilization provider serves as the primary participant of the Radiation Pilot Program, FDA anticipates that close collaboration between sterilization providers and PMA holders will be necessary to ensure the success of the pilot program. Accordingly, the procedures for sterilization providers and PMA holders are set forth below.

1. Procedures for Sterilization Providers

To be considered for the voluntary Radiation Pilot Program, a sterilization provider should submit the following information in a Master File for the Agency's review with a cover sheet clearly indicating "Radiation Sterilization Master File Pilot Program" in the subject heading:

- a. Name, address, and FDA Establishment Identification (FEI) number of the proposed sterilization facility.
- b. List of device(s) to be sterilized (identified by manufacturer, trade name, model number, and PMA number) if known at the time of submission, and a letter of authorization from each PMA holder for each identified device.⁷
- c. Clear identification of all responsibilities of the sterilization facility and device manufacturers with respect to sterilization validation.
- d. For sterilization providers proposing to implement changes according to section (I)(A)(4)(a through c) above: a complete description of all qualification testing used to support validation of the device(s) under the proposed radiation sterilization process including:
 - (1) A complete description of the proposed sterilization cycle(s) including radiation type, target dose, dose range, sterilization load geometry relative to the radiation source, etc.

⁷ List of device(s) should reflect known devices to be sterilized at the time of submission of the Master File. Subsequent revisions to the list of device(s) should be submitted as an amendment to the Master File.

- (2) A risk analysis with identified risk mitigation measures to address any risks that may impact the PMA approved device's product parameters or safety and effectiveness profile. This should also include an analysis of material compatibility considerations and how risks related to material compatibility are mitigated.
- (3) Installation Qualification, Operational Qualification, and Performance Qualification methodology.
- (4) Clear, detailed product definition, along with a documented procedure for determining whether a device meets the product definition, or confirmation that the product definition has not differed from the approved PMA.
- (5) All reports, protocols, and process summaries presented in an easily understandable template that supports incorporation of the PMA product to be sterilized in its defined package and load configuration.
- (6) Process capability for the radiation sterilization process.
- (7) Identification and explanation of common potential protocol deviations, along with proposed mitigation of potential deviations. The Master File should also include a strategy to address any deviations that could significantly affect the safety or effectiveness of a device and any deviations not addressed in the Master File.
- (8) Identification and explanation of management structure and involvement for process and facility review.
- (9) Acceptable installation and operational requalification schedule to support continuous process effectiveness.
- (10) A structured program and schedule for independent audits and monitors.
- (11) The sterilization facility's inspectional history and history of compliance with applicable regulations (including, but not limited to, requirements under parts 814 and 820 (21 CFR parts 814 and 820)).

e. For sterilization providers proposing to implement changes according to section

(I)(A)(4)(d) above: in addition to the description of all qualification testing used to support validation of the device(s) under the proposed radiation sterilization process requested in section (I)(B)(1)(d) above:

- (1) A description of how the change from EO sterilization to radiation sterilization is validated to not negatively impact device performance or specifications.
- (2) A description of how biocompatibility is assessed for devices that are switched from EO sterilization to radiation sterilization and the methods used to ensure that biocompatibility is not significantly affected.
- (3) A description of how material compatibility is assessed to support the change from EO sterilization to radiation sterilization.

For more information on Master Files, see FDA's website: <https://www.fda.gov/medical-devices/premarket-approval-pma/master-files>.

Upon receipt of a Master File containing the above information, FDA will determine a sterilization provider's eligibility in the pilot program by evaluating whether the criteria outlined in sections (I)(A) and (I)(B)(1) above have been met and provide written feedback that FDA either accepts the Master File into the Radiation Pilot Program, or rejects the Master File as not eligible for the pilot program. FDA intends to work interactively with the Master File holder to address any deficiencies with the information provided in the Master File. If a Master File is rejected from the pilot program, the written feedback will identify the reason(s) the Master File was rejected.

If accepted into the pilot program, the Master File holder should submit amendments every 6 months with information on any process changes, new devices, or PMA submissions brought into the pilot program, and any other changes to the information contained in the Master File, to maintain participation in the pilot program. If there are no updates or changes, the Master File holder should notify FDA of the absence of any updates or changes in the amendment. If a

sterilization provider is accepted into the pilot program and does not maintain participation (e.g., through non-submission of amendments, updates, or other information requested by FDA under the pilot program or through no longer meeting the eligibility criteria) or no longer wishes to participate in the pilot program, the sterilization provider should notify PMA holders to whom they granted a right of reference to the Master File. If the Master File holder does not maintain participation in the pilot program, FDA may determine that the Master File is outside the scope of the pilot program.

2. Procedures for PMA Holders

FDA will consider permitting PMA holders affected by a sterilization provider's participation in the Radiation Pilot Program to reference the sterilization provider's existing Master File in a postapproval report to the Agency, as an alternative to the submission of a PMA supplement under § 814.39(a) and (e). The postapproval report should be submitted with a cover sheet clearly indicating "Periodic Report for Radiation Sterilization Master File Pilot Program" in the subject heading, in accordance with § 814.84⁸, and with the following information:

- a. Name, address, and FEI number of the sterilization facility.
- b. Master File number in which the referenced sterilization procedures are described, with signed right of reference from the Master File holder.
- c. List of device(s) sterilized (identified by manufacturer, trade name, model number, and PMA number).

Upon receipt of a postapproval report containing the above information, FDA will notify the PMA holder of whether the postapproval report is permitted as an alternate submission under § 814.39(a) and (e). Additionally, FDA will notify the PMA holder of whether the PMA identified device(s) and referenced Master File are eligible for the sterilization provider's

⁸If the PMA holder chooses, they may provide a reference to the Master File in a postapproval report in lieu of the information required under § 814.84(b)(2)(I) as it pertains to the sterilization changes described in the Master File, if the information included in the postapproval report is determined to be acceptable as described in this pilot notice.

participation in the pilot. If the PMA is not eligible for the sterilization provider's participation in the pilot program, FDA will notify the PMA holder of the reasons for rejection.

This Pilot Program does not otherwise remove or replace any requirements, such as, but not limited to, recordkeeping and reporting requirements under part 814 or part 820. It is the manufacturer's responsibility to ensure compliance with applicable laws and regulations administered by FDA.

During this voluntary Radiation Pilot Program, CDRH staff intends to be available to answer questions or concerns that may arise. The Radiation Pilot Program participants may comment on and discuss their experiences with the Center.

II. Paperwork Reduction Act of 1995

This notice refers to previously approved collections of information found in FDA regulations. These collections of information are subject to review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501-3521). The collections of information in part 814, subparts A through E, regarding premarket approval, have been approved under OMB control number 0910-0231. The collections of information in part 820, regarding the Quality System Regulation, have been approved under OMB control number 0910-0073.

III. References

The following references are on display at the Dockets Management Staff (HFA-305), Food and Drug Administration, 5630 Fishers Lane, Rm. 1061, Rockville, MD 20852, 240-402-7500, and are available for viewing by interested persons between 9 a.m. and 4 p.m., Monday through Friday; they are also available electronically at <https://www.regulations.gov>. FDA has verified the website addresses, as of the date this document publishes in the *Federal Register*, but websites are subject to change over time.

1. FDA, "FDA Executive Summary Prepared for the November 6-7, 2019 meeting of the General Hospital and Personal Use Devices Panel of the Medical Devices Advisory Committee,"

available at: <https://www.fda.gov/advisory-committees/advisory-committee-calendar/november-6-7-2019-general-hospital-and-personal-use-devices-panel-medical-devices-advisory-committee>.

2. FDA, Sterilization for Medical Devices, available at: <https://www.fda.gov/medical-devices/general-hospital-devices-and-supplies/ethylene-oxide-sterilization-medical-devices>.

3. FDA, PMA Supplements and Amendments, available at: <https://www.fda.gov/medical-devices/premarket-approval-pma/pma-supplements-and-amendments>.

4. National Academies of Sciences, Engineering, and Medicine. 2021. Radioactive Sources: Applications and Alternative Technologies. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26121>.

5. FDA, “Statement on Concerns With Medical Device Availability Due to Certain Sterilization Facility Closures,” available at: <https://www.fda.gov/news-events/press-announcements/statement-concerns-medical-device-availability-due-certain-sterilization-facility-closures>.

Dated: April 6, 2023.

Lauren K. Roth,

Associate Commissioner for Policy.

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